CLAIMS

Amend the claims as follows.

1. (Currently amended) A digital branch calibrator for use in an RF transmitter ~~for compensating~~ to compensate for phase and/or gain imbalances between two phasor fragment signals in a transmit path from a phasor fragmenter in a digital front end of said transmitter to a power amplification and combining component in an analog front end of said transmitter outputting an RF transmit signal based on a sum of said fragment signals, said calibrator comprising:

(a) a closed loop controller operable during a calibration sequence, defined by a predetermined number of control loop iterations, and comprising transmit and feedback signal paths, said transmit signal path ~~configured for transmitting~~ to transmit a zero base band transmit signal and said feedback signal path ~~configured for receiving~~ to receive a feedback signal correlated with a power level of said output RF transmit signal, said transmit signal path comprising a phase and/or gain adjusting component ~~configured for adjusting~~ to adjust the phase and/or gain of said phasor fragment signals to minimize said power level, said adjusting being performed iteratively to the end of said calibration sequence and resulting in sequence phase and/or gain update signals, ~~whereby~~ wherein said sequence update signals are provided for updating the phase and/or gain of data signals transmitted through said transmit signal path; and~~,~~

(b) digital signal processing means ~~configured for operating~~ to operate said controller and ~~controlling~~ to control said transmission of said zero base band transmit signal for processing by said calibrator;

wherein said closed loop controller further comprises false imbalance removal means to remove from said feedback signal any portion thereof correlating to local oscillator and/or other non-imbalance feed through energy at the carrier frequency, said false imbalance removal means comprising a digital modulator/demodulator to modulate said zero base band signal by a sub-carrier frequency signal and to demodulate said feedback signal; and

wherein said phase and/or gain adjusting component comprises a complex accumulator to decimate said feedback signal.

2.-3. (Canceled)

4. (Currently amended) A calibrator according to claim ~~3~~ 1 wherein said phase

and/or gain adjusting ~~is performed by alternating~~ component is adapted to alternate iterations of phase adjustments and iterations of gain adjustments.

5. (Currently amended) A calibrator according to claim ~~3~~ 1 wherein said phase adjusting produces a phase gradient calculated from ~~the~~ a magnitude of said feedback signal, ~~the~~ a sign of ~~the~~ a differential of ~~the~~ a phase adjustment from one iteration to ~~the~~ a next iteration and ~~the~~ a sign of ~~the~~ a differential of the magnitude of said feedback signal from one iteration to the next iteration and said gain adjusting produces a gain gradient calculated from the magnitude of said feedback signal, the sign of the differential of ~~the~~ a gain adjustment from one iteration to the next iteration and the sign of the differential of the magnitude of said feedback signal from one iteration to the next iteration.

6. (Currently amended) A calibrator according to claim ~~3~~ 1 wherein said gain ~~update~~ gradient(s) ~~signal(s)~~ are calculated so as to limit the magnitudes of said phasor fragment signals to a predetermined maximum value L and so that the magnitude of at least one of said phasor fragment signals has the value L.

7. (Currently amended) An RF transmitter having a LINC architecture ~~and~~ comprising:

a digital front end with a fragmenter ~~configured for fragmenting~~ to fragment an input signal into a plurality of output fragment signals which sum to said input signal~~,~~; and

an analog front end ~~for amplification and combining of~~ to amplify and combine said fragment signals~~, said transmitter comprising a calibrator according to claim 2 and further comprising~~;

an in-phase (I), quadrature-phase (Q) signal pre-balancing component (IQPBAL) in the digital front end transmit path ~~configured for mitigating~~ to mitigate I/Q phase and/or gain imbalances on each said fragment signal;

a digital branch calibrator for use in an RF transmitter to compensate for phase and/or gain imbalances between two phasor fragment signals in a transmit path from a phasor fragmenter in a digital front end of said transmitter to a power amplification and combining component in an analog front end of said transmitter to output an RF transmit signal based on a sum of said fragment signals, the calibrator including:

(a) a closed loop controller operable during a calibration sequence, defined by

a predetermined number of control loop iterations, and comprising transmit and feedback signal paths, said transmit signal path to transmit a zero base band transmit signal and said feedback signal path to receive a feedback signal correlated with a power level of said output RF transmit signal, said transmit signal path comprising a phase and/or gain adjusting component to adjust the phase and/or gain of said phasor fragment signals to minimize said power level, said adjusting being performed iteratively to the end of said calibration sequence and resulting in sequence phase and/or gain update signals, where said sequence update signals are provided to update the phase and/or gain of data signals transmitted through said transmit signal path; and~~,~~

(b) digital signal processing means to operate said controller and to control said transmission of said zero base band transmit signal for processing by said calibrator;

wherein said closed loop controller further comprises false imbalance removal means to remove from said feedback signal any portion thereof correlating to local oscillator and/or other non-imbalance feed through energy at the carrier frequency, said false imbalance removal means comprising a digital modulator/demodulator to modulate said zero base band signal by a sub-carrier frequency signal and to demodulate said feedback signal; and

a DC removal component configured to remove DC signal components of said feedback signal, said DC removal component comprising means for estimating the DC signal level and means for removing said DC estimation from said feedback signal.

8. (Canceled)

9. (Currently amended) A method for compensating for phase and/or gain imbalances between two phasor fragment signals in a transmit path of an RF transmitter outputting an RF transmit signal based on a sum of said fragment signals, said method comprising:

(a) transmitting a zero base band transmit signal along a transmit path during a calibration sequence defined by a predetermined number of iterations;

(b) receiving a feedback signal correlated with a power level of said output RF transmit signal; and,

(c) adjusting ~~the~~ a phase and/or gain of said phasor fragment signals to minimize said power level, said adjusting being performed iteratively to ~~the~~ an end of said calibration sequence and resulting in sequence phase and/or gain update signals, where~~by~~ said sequence

update signals are provided ~~for updating~~ to update the phase and/or gain of data signals transmitted through said transmit signal path; and

(d) removing from said feedback signal any portion thereof correlating to local oscillator and/or other non-imbalance feed through energy at the carrier frequency, said removing including modulating said zero base band signal by a sub-carrier frequency signal and demodulating said feedback signal;

where said phase and/or gain adjusting includes alternating iterations of phase adjustments and iterations of gain adjustments.

10.-11. (Canceled)

12. (Currently amended) A method ~~according to claim 10~~ to compensate for phase and/or gain imbalances between two phasor fragment signals in a transmit path of an RF transmitter outputting an RF transmit signal based on a sum of said fragment signals, said method comprising:

(a) transmitting a zero base band transmit signal along a transmit path during a calibration sequence defined by a predetermined number of iterations;

(b) receiving a feedback signal correlated with a power level of said output RF transmit signal; and,

(c) adjusting a phase and/or gain of said phasor fragment signals to minimize said power level, said adjusting being performed iteratively to an end of said calibration sequence and resulting in sequence phase and/or gain update signals, where said sequence update signals are provided to update the phase and/or gain of data signals transmitted through said transmit signal path; and

(d) removing from said feedback signal any portion thereof correlating to local oscillator and/or other non-imbalance feed through energy at the carrier frequency, said removing including modulating said zero base band signal by a sub-carrier frequency signal and demodulating said feedback signal;

where~~by~~ said ~~phase~~ adjusting includes producing a phase gradient calculated from ~~the~~ a magnitude of said feedback signal, ~~the~~ a sign of ~~the~~ a differential of ~~the~~ a phase adjustment from one iteration to ~~the~~ a next iteration and ~~the~~ a sign of ~~the~~ a differential of the magnitude of said feedback signal from one iteration to the next iteration and where said ~~gain~~ adjusting includes producing a gain gradient calculated from the magnitude of said feedback signal, ~~the~~

a sign of ~~the~~ a differential of ~~the~~ a gain adjustment from one iteration to the next iteration and the sign of the differential of the magnitude of said feedback signal from one iteration to the next iteration.

13. (Currently amended) A method ~~according to claim 10~~ to compensate for phase and/or gain imbalances between two phasor fragment signals in a transmit path of an RF transmitter outputting an RF transmit signal based on a sum of said fragment signals, said method comprising:

(a) transmitting a zero base band transmit signal along a transmit path during a calibration sequence defined by a predetermined number of iterations;

(b) receiving a feedback signal correlated with a power level of said output RF transmit signal; and,

(c) adjusting a phase and/or gain of said phasor fragment signals to minimize said power level, said adjusting being performed iteratively to an end of said calibration sequence and resulting in sequence phase and/or gain update signals, where said sequence update signals are provided to update the phase and/or gain of data signals transmitted through said transmit signal path; and

(d) removing from said feedback signal any portion thereof correlating to local oscillator and/or other non-imbalance feed through energy at the carrier frequency, said removing including modulating said zero base band signal by a sub-carrier frequency signal and demodulating said feedback signal;

where~~by~~ said gain update signal(s) are calculated so as to limit ~~the~~ magnitudes of said phasor fragment signals to a predetermined maximum value L and so that ~~the~~ a magnitude of at least one of said phasor fragment signals has the value L.